

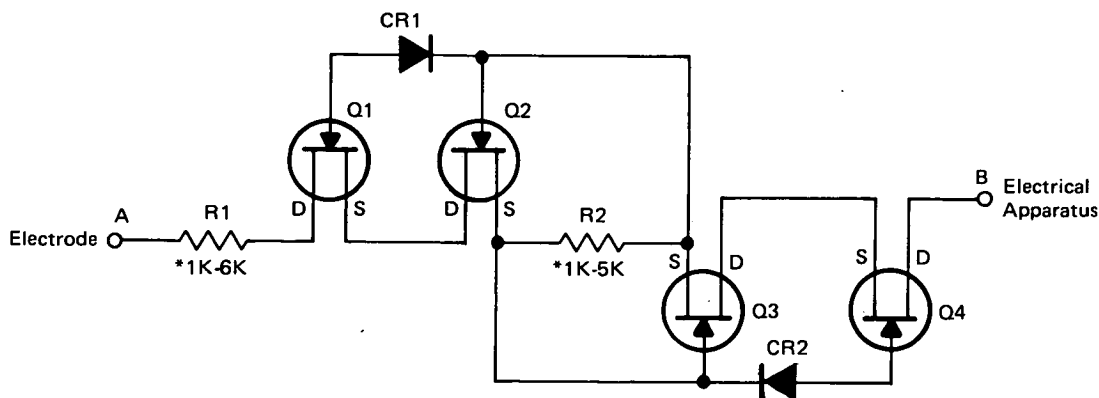
NASA TECH BRIEF

Lyndon B. Johnson Space Center



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Electroshock Protection Circuit



* R_1 and R_2 Electrical Values and Characteristics are Determined by the Particular Application

One of the primary dangers of accidental shock exists during the use of electrocardiographs and electroencephalographs and other electrical apparatus that are attached directly to the patient. The degree of hazard present with bioelectronic instruments can be reduced by proper, careful use, but the possibility of human error still exists.

As part of the Skylab program, an electroshock protection circuit was developed to prevent accidental shock through the electrodes to the test subjects. This circuit is placed between the electrical apparatus and the electrode that is attached to the patient's body.

The circuit, which is shown in the diagram, allows undistorted signal voltage transfer, as long as the current remains low. If a high current tries to flow from terminal A toward terminal B, it will produce a potential difference across resistor R_2 to the extent that the left side of R_2 is at a higher potential than the right side. This potential biases the gate electrodes of the field-effect transistors, Q_3 and Q_4 , to produce an extremely high impedance. Similarly, a current flow in the opposite direction is cut off by a bias on the gates of Q_1 and Q_2 .

This circuit effectively protects the patient from dangerous electrical shock that might be caused by a

failure in the electrical apparatus. When a 1,000-Hz signal at 141 Vac (rms) is applied to the terminals of the network, the current is limited to approximately 87 μ A.

Notes:

1. This electroshock protection circuit may also be used to protect sensitive electrical measuring circuits.
2. Requests for further information may be directed to:
Technology Utilization Officer
Lyndon B. Johnson Space Center
Code JM7
Houston, Texas 77058
Reference: TSP73-10261

Patent status:

NASA has decided not to apply for a patent.

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Category 02, 05